

CLAIMS

1. A method for treating woodchips, comprising the steps of:
 - preparing a DNA encoding an antisense RNA substantially complementary to the whole or a part of a transcription product of a cellulolytic enzyme gene derived from Basidiomycete;
 - preparing a vector comprising (a) said DNA, or (b) a recombinant DNA comprising said DNA and a DNA fragment having a promoter activity, wherein said DNA binds to said DNA fragment such that an antisense RNA of the cellulolytic enzyme gene is generated as a result of transcription;
 - transforming host cells with said vector, so as to prepare the host cells having a suppressed cellulolytic enzyme activity; and
 - inoculating said host cells having a suppressed cellulolytic enzyme activity into woodchips to treat them.
2. The method according to claim 1, wherein the cellulolytic enzyme gene comprises one or more genes selected from the group consisting of respective genes encoding a cellobiose dehydrogenase, cellobiohydrolase I, cellobiohydrolase II, an endoglucanase belonging to glycolytic enzyme family 61, an endoglucanase belonging to glycolytic enzyme family 12, an endoglucanase belonging to glycolytic enzyme family 5, and an endoglucanase belonging to glycolytic enzyme family 9.
3. The method according to claim 2, wherein the cellobiose dehydrogenase gene is an isolated cellobiose dehydrogenase gene comprising any one of the following nucleotide sequences (a) to (c):
 - (a) a nucleotide sequence as shown in SEQ ID No. 1 or 3;
 - (b) a nucleotide sequence hybridizing with a nucleotide sequence comprising a nucleotide sequence complementary to the nucleotide sequence according to (a) under stringent conditions, and encoding a protein having a cellobiose dehydrogenase enzyme activity; and

(c) a nucleotide sequence comprising deletion, substitution or addition of one or more nucleotides with respect to SEQ ID No. 1 or 3, and encoding a protein having a cellobiose dehydrogenase enzyme activity.

4. The method according to claim 2, wherein the cellobiohydrolase I gene is an isolated cellobiohydrolase I gene comprising any one of the following nucleotide sequences (a) to (c):

(a) a nucleotide sequence as shown in SEQ ID No. 7, 9, or 11;

(b) a nucleotide sequence hybridizing with a nucleotide sequence comprising a nucleotide sequence complementary to the nucleotide sequence according to (a) under stringent conditions, and encoding a protein having a cellobiohydrolase I gene enzyme activity; and

(c) a nucleotide sequence comprising deletion, substitution or addition of one or more nucleotides with respect to SEQ ID No. 7, 9 or 11, and encoding a protein having a cellobiohydrolase I gene enzyme activity.

5. The method according to claim 2, wherein the cellobiohydrolase II gene is an isolated cellobiohydrolase II gene comprising any one of the following nucleotide sequences (a) to (c):

(a) a nucleotide sequence as shown in SEQ ID No. 14;

(b) a nucleotide sequence hybridizing with a nucleotide sequence comprising a nucleotide sequence complementary to the nucleotide sequence according to (a) under stringent conditions, and encoding a protein having a cellobiohydrolase II gene enzyme activity; and

(c) a nucleotide sequence comprising deletion, substitution or addition of one or more nucleotides with respect to SEQ ID No. 14, and encoding a protein having a cellobiohydrolase II gene enzyme activity.

6. The method according to claim 2, wherein the endoglucanase gene belonging to glycolytic enzyme family 61 is an isolated endoglucanase gene belonging to glycolytic enzyme family 61 comprising any one of the following nucleotide sequences (a) to (c):

(a) a nucleotide sequence as shown in SEQ ID No. 18;

(b) a nucleotide sequence hybridizing with a nucleotide sequence comprising a nucleotide sequence complementary to the nucleotide sequence according to (a) under stringent conditions, and encoding a protein having an activity of endoglucanase enzyme belonging to glycolytic enzyme family 61; and

(c) a nucleotide sequence comprising deletion, substitution or addition of one or more nucleotides with respect to SEQ ID No. 18, and encoding a protein having an activity of endoglucanase enzyme belonging to glycolytic enzyme family 61.

7. The method according to claim 2, wherein the endoglucanase gene belonging to glycolytic enzyme family 12 is an isolated endoglucanase gene belonging to glycolytic enzyme family 12 comprising any one of the following nucleotide sequences (a) to (c):

(a) a nucleotide sequence as shown in SEQ ID No. 20;

(b) a nucleotide sequence hybridizing with a nucleotide sequence comprising a nucleotide sequence complementary to the nucleotide sequence according to (a) under stringent conditions, and encoding a protein having an activity of endoglucanase enzyme belonging to glycolytic enzyme family 12; and

(c) a nucleotide sequence comprising deletion, substitution or addition of one or more nucleotides with respect to SEQ ID No. 20, and encoding a protein having an activity of endoglucanase enzyme belonging to glycolytic enzyme family 12.

8. The method according to claim 2, wherein the endoglucanase gene belonging to glycolytic enzyme family 5 is an isolated endoglucanase gene belonging to glycolytic enzyme family 5 comprising any one of the following nucleotide sequences (a) to (c):

(a) a nucleotide sequence as shown in SEQ ID No. 24;

(b) a nucleotide sequence hybridizing with a nucleotide sequence comprising a nucleotide sequence complementary to the nucleotide sequence according to (a) under stringent conditions, and encoding a protein having an activity of endoglucanase enzyme belonging to glycolytic enzyme family 5; and

(c) a nucleotide sequence comprising deletion, substitution or addition of one or more nucleotides with respect to SEQ ID No. 24, and encoding a protein having an activity of endoglucanase enzyme belonging to glycolytic enzyme family 5.

9. The method according to claim 2, wherein the endoglucanase gene belonging to glycolytic enzyme family 9 is an isolated endoglucanase gene belonging to glycolytic enzyme family 9 comprising any one of the following nucleotide sequences (a) to (c):

(a) a nucleotide sequence as shown in SEQ ID No. 28;

(b) a nucleotide sequence hybridizing with a nucleotide sequence comprising a nucleotide sequence complementary to the nucleotide sequence according to (a) under stringent conditions, and encoding a protein having an activity of endoglucanase enzyme belonging to glycolytic enzyme family 9; and

(c) a nucleotide sequence comprising deletion, substitution or addition of one or more nucleotides with respect to SEQ ID No. 28, and encoding a protein having an activity of endoglucanase enzyme belonging to glycolytic enzyme family 9.

10. The method according to any one of claims 1 to 9, wherein Basidiomycete is *Coriolus hirsutus* or *Phanerochaete chrysosporium*.

11. The method according to any one of claims 1 to 10, wherein host cells are *Coriolus hirsutus*.

12. A woodchip obtained by the method according to any one of claims 1 to 11.

13. A method for producing a pulp using the woodchip according to claim 12.

14. A pulp obtained by the method according to claim 13.